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| INTELLECTUAL PROPERTY / TECHNOLOGY LAW | | | EXAMINER | |
| PO BOX 14329 | | | GROSS, CHRISTOPHER M | |
| RESEARCH TRIANGLE PARK, NC 27709 | | | | |
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| | | | 1639 | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/805,044

Applicant(s)

JUNG ET AL.

Examiner

CHRISTOPHER M. GROSS

Art Unit

1639

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 April 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 7-31 is/are pending in the application.
- 4a) Of the above claim(s) 1-5, 12, 14-21, 27 and 29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-11, 13, 22-26, 28, 30, 31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Responsive to communications entered 4/11/2008 (eDAN date 7/24/2008). Claims 1-5, 7-31 are pending. Claims 1-5, 12,14-21,27 and 29 are withdrawn. Claims 7-11,13,22-26,28,30,31 are under consideration.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Priority

The present application has a US filing date of 3/19/2004. Acknowledgment is again made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d) to Korean patents 10-2003-0051140 filed 07/24/2003 and 10-2003-0051826 filed 07/26/2003. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Withdrawn Objection(s) and/or Rejection(s)

The rejection of claims 7-11, 13, 22-26, 30, 28, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Niu et al** (US Patent 6,872,681) in view of **Mamedov et al** (2002 Nature Materials 1:190-194) is hereby withdrawn in view of applicant's amendments to the claims.

Claim Rejections - 35 USC § 112

The following is a quotation of the **second** paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7-11,13,22-26,28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

This rejection is necessitated by Applicant's amendment to the claims.

Claims 7 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships concern the lack of an chemical anchor set forth in part (b) of each of claim 7 and 22 versus the amine group on the surface of a substrate.

Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999).

Here, to one of ordinary skill in the art, an anchor (a.k.a. a linker or handle) represents a chemical moiety which acts as an interface between a substrate and an immobilized molecule of interest. The amine set forth in part (a) of each of claim 7 and 22 acts as an anchor. However, part (b) of the offending claims recite "without the use of a chemical anchor," which seemingly contradicts what was performed in part (a).

The phrase "chemical anchor" is indefinite because the specification does not clearly redefine the term and it is ambiguous as to whether the claim does or does not require it.

Therefore as currently written, the metes and bounds of the claims are unascertainable and accordingly claims 7 and 22 and all dependent claims are rejected under 35 USC 112, second paragraph.

The following is a quotation of the **first** paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 7-11,13,22-26,28,30,31 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. This rejection concerns "new matter."

This rejection is necessitated by Applicant's amendment to the claims.

Claims 7,22, and 30 have been amended such that the CNT are bonded without the use of chemical anchors.

The specification as originally filed provided no implicit or explicit support for chemical anchors.

Applicants are reminded that it is their burden to show where the specification supports any amendments to the disclosure. See MPEP 714.02, paragraph 5, last sentence and also MPEP 2163.06 I.

MPEP 2163.06 notes "If new matter is added to the claims, the examiner should reject the claims under 35 U.S.C. 112, first paragraph - written description requirement. *In re Rasmussen*, 650 F.2d 1212, 211 USPQ 323 (CCPA 1981)." MPEP 2163.02 teaches that "Whenever the issue arises, the fundamental factual inquiry is whether a claim defines an invention that is clearly conveyed to those skilled in the art at the time the application was filed...If a claim is amended to include subject matter, limitations, or terminology not present in the application as filed, involving a departure from, addition to, or deletion from the disclosure of the application as filed, the examiner should conclude that the claimed subject matter is not described in that application. MPEP 2163.06 further notes "When an amendment is filed in reply to an objection or rejection based on 35 U.S.C. 112, first paragraph, a study of the entire application is often necessary to determine whether or not "new matter" is involved. *Applicant should therefore specifically point out the support for any amendments made to the disclosure.*

New Claim Rejection(s) – 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chiu et al** (2002 Applied Physics Letters 80:3811-3813) in view of **Occhipinti et al** (US Patent 7,272,511).

This rejection is necessitated by Applicant's amendment to the claims.

Claim 30 is drawn to a multilayer CNT structure, consisting essentially of: a substrate and multiple CNT layers on the substrate, wherein said multiple CNT layers include (i) CNTs bonded to the substrate via peptide linkages (-NHC(O)-), (ii) CNTs bonded to other CNTs via linkers including CNT-connecting peptide linkages (-NHC(O)-) and (iii) CNTs having pendant carboxyl functionality wherein the multiple CNT are bonded to other CNTs without use chemical anchor.

Claim 31 includes a biomolecule coupled thereto the multilayer CNT structure of claim 30.

Chiu et al teach, throughout the document and especially figures 1 and 2, a substrate comprising two CNT layers including CNTs bonded to other CNTs via junctions including CNT-connecting peptide linkages (-NHC(O)-); the CNTs having

pendant carboxyl functionality and wherein the multiple CNT bonded to other CNTs without use chemical anchor.

Chiu et al do not teach: CNTs bound to a substrate via peptide linkages (-NHC(O)-), as set forth in claim 30(i); a multilayer CNT structure including biomolecules, as set forth in claim 31.

Occhipinti et al teach throughout the document and especially figure 17, a molecular memory device comprising carbon nanotubes bound to a support through a peptide (amide) linkage bearing an oligonucleotide (a biomolecule).

It would have been *prima facie* obvious for one of ordinary skill in the art, at the time the claimed invention was made to apply the multiple layer CNTs connected through peptide junctions per Chiu et al to toward the memory device according to Occhipinti et al.

One of ordinary skill in the art would have been motivated to use the multiple layer CNTs connected through peptide junctions per Chiu et al with the memory device according to Occhipinti et al because the junctions are electrically reliable, according to Chiu et al in the second paragraph on p 3811, which is important for an electrical device, such as disclosed by Occhipinti et al in figure 18.

One of ordinary skill in the art would have had a reasonable expectation of success in applying the CNTs connected through peptide junctions Chiu et al with the memory device according to Occhipinti et al because the carbon nanotubes of both references would be expected to have similar chemical reactivity, thus the multiple layer

CNTs connected through peptide junctions per Chiu lie well within the scope of technology according to Occhipinti et al.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Gross whose telephone number is (571)272-4446. The examiner can normally be reached on M-F 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, J. Douglas Schultz can be reached on 571 272-0763. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Christopher M Gross
Examiner
Art Unit 1639

cg

/JD Schultz, PhD/

Supervisory Patent Examiner, Art Unit 1635